The Use of Concurrent Engineering in Space Mission Design

by Stephen D. Wall

In recent years, conceptual-phase design of space missions has been improved considerably. Team structures (e. g., concurrent engineering (CE)), tool linkage, specialized facilities known as design centers and scripted processes have been demonstrated to cut proposal-level engineering design time from a few months to a few weeks. Costs for preparing the designs are substantially reduced, enabling the assembly of program "roadmaps" from a stable of many potential missions. Several instances exist; a few have dependably produced metrics that show remarkable decreases in time and expense of creating preliminary designs.

In this paper we consider possible advantages of these same techniques in the formulation, or detailed, phase of design. We propose a methodology that uses three such teams working in parallel. One team balances requirements, resources and capability against each other. A second team does the design, first in models, then proceeding to actual hardware and software. Finally, a third team oversees system level test. We report on an experiment in which we have assembled a prototype of the first of these teams and operate it in a mock session.